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THE EFFECTS OF TYPING INSTRUCTION ON CREATIVITY AND ACHIEVEMENT AMONG THE GIFTED.

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TWO GROUPS OF 31 OR MORE FOURTH-GRADE CHILDREN, WHO SCORED 115 OR HIGHER ON THE 1960 STANFORD-BINET INTELLIGENCE SCALE, RECEIVED ENRICHMENT IN CREATIVE THINKING AND WRITING. ONE GROUP RECEIVED TYPING INSTRUCTION. PRETESTS ADMINISTERED IN THE FOURTH GRADE AND AGAIN TO THE SAME STUDENTS AT THE SIXTH GRADE INCLUDED THE CALIFORNIA ACHIEVEMENT TESTS (READING AND SPELLING), WORK-STUDY SKILLS TESTS OF THE IOWA EVERY PUPIL TESTS OF BASIC SKILLS, GUILFORD UNUSUAL USES AND CONSEQUENCES TESTS, AND A CREATIVE WRITING TEST. RESULTS SHOWED THAT THE USE OF TYPING BY ACADEMICALLY TALENTED INTERMEDIATE GRADE CHILDREN WAS NOT HARMFUL TO ACHIEVEMENT IN WORK-STUDY SKILLS, READING, AND SPELLING. THE EXPERIMENTAL GROUP USING TYPEWRITERS SHOWED SIGNIFICANTLY GREATER GAINS IN CREATIVE WRITING AND CREATIVE THINKING THAN DID THE CONTROL GROUP. (JA)

Caution

ED 020 823

# Among the Gifted

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Champaign Community Unit 4 Schools
Department of Special Services
C. H. Mellon
Superintendent of Schools
August, 1963

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## FOREWORD

The Champaign Board of Education has encouraged and supported its professional staff in their efforts to improve curricular offerings and to participate in training programs designed to provide in-service personal and professional growth.

The Special Services personnel has long been interested in the role of research in improving the school program, thus they seek solutions to school problems using an experimental approach. The complexity of civilization today and the tremendous accumulation of knowledge make it imperative that academically talented children be provided a program that will increase their creative ability and make them flexible and fluent thinkers. Workable solutions to problems of the future may well depend on the ability of leaders to find new ways and new approaches to solving them.

It cannot be too highly recommended that school systems everywhere participate in the search for ways to help teachers develop creativity in tomorrow's leaders.

E. H. Mellon
Superintendent of Schools

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# THE EFFECTS OF TYPING INSTRUCTION ON CREATIVITY AND ACHIEVEMENT AMONG THE GIFTED

## Chapter I

## PROBLEM

There is considerable discussion in the literature as to need for enriching the curriculum for the more able or the academically talented pupils. Just how this enrichment is brought about is not so clear. There is also concern among some that if more is added to the conventional curriculum, achievement in the tool subjects will suffer. Further research needs to be conducted to determine the worth of specific enrichment activities and to measure the effects of such activities on the achievement in the basic tool subjects. In addition, instruments must be developed to measure learnings which most existing standardized achievement tests fail to measure, e.g., growth in creative thinking and creative writing.

This research investigated the effects on achievement and creativity of academically talented intermediate grade pupils when typewriters were used in an enriched curriculum which stresses creative thinking and creative writing. To test the value of this approach an experimental and a contrast group of intermediate grade children of comparable intelligence and socio-economic levels were identified. Creative thinking and creative writing were stressed with both groups. Typing was used as an integral part of the curriculum in the experimental group. The contrast group was not taught the skills of typing.

## Chapter II

## REVIEW OF RELATED LITERATURE

Much has been written about the use of the typewriter with elementary school children. Many studies have been conducted investigating the effects of introducing typewriting into the elementary program. As early as 1928, Henry Goddard (1928) wrote that in the years to come, the typewriter would be considered a valuable tool in the classroom. Prior to 1930, most experimentation was concerned with the effects of typewriting on handwriting. The emphasis was on errors, and speed in typing versus errors, speed, and quality of handwriting. Many of these studies were carried on with the adolescent, or adult age group. Conrad (1935), however, conducted such a study with 150 children in grades 2-4. She concluded that "...the typewriter is influential in developing the children's creative writing, does not affect handwriting detrimentally but appears to stimulate both quality and speed in handwriting" (Conrad, 1935, p. 264). Most studies concerned with the effect of typewriting on handwriting support Conrad's conclusion.

In the late 1920's and in the 1930's there were a number of studies concerned with the teaching of typing per se to elementary school children. Phillip's (1942) study with fourth and fifth grade children showed that after an initial period of instruction and practice, children could operate the typewriter efficiently and use systematic fingering. They could also type more rapidly than they could write with a pencil. These early studies showed that, in general, the skill of typewriting can be successfully learned by children in the elementary grades. But as Hutchings states: "It must be understood that the primary purpose of teaching typewriting

in the lower grades is not to develop actual ability to typewrite (not that such skill, even at an early age, would not be valuable), but rather to achieve other values that seem to result from including typing instruction." (Hutchings, 1951, p. 499)

A number of studies have been conducted which investigated the effects on achievement in various tool subjects when typing had been included in the regular curriculum. Forrester's (1934) study was conducted with a group of 234 children in grades 3-6. There was an experimental and control group in each grade. The study showed no significant differences in achievement as measured by the Stanford Achievement Tests but children using typewriters tended to surpass those using handwriting in the content quality of written work. But among the early studies investigating the effect of typing on achievement in different areas, the most significant ones are perhaps those of Wood and Freeman (1932), Haefner (1937), Unzicker (1934) and Freeman (1932). Unzicker (1934) found that first grade pupils could profit from typing and concluded that in beginning reading there is a trend of slight but constant superiority on the part of pupils who used the typewriter. A study by Wood and Freeman (1932) showed that children who used the typewriter advanced more rapidly in all subject matter in elementary school than children who did not use the typewriter. In 1937, Haefner summarized the research on the effects of typing in the elementary program including his own work and observations. He wrote that research indicated that typing facilitates reading by helping children to distinguish between similar words and to select a specific word from a group with similar spellings. Typing, he concluded, helps children in understanding the detailed character of words which is a fundamental skill in accurate reading. Haefner further noted that typing did not harm handwriting and

made spelling more attractive to children. Then too, he reported that while typing influences children to increase the total volume of written work it also had some good effects on the quality of the written work such as the use of longer sentences and words. Haefner observed that typing facilitated work in arithmetic also and concluded: "...through its effects on the three R's the typewriter touches in some degree, most of the other activities that are important in the education of children." (Haefner, 1937, p. 30)

The years between the late 1930's to the past decade evidenced comparatively little research on the role of the typewriter in the elementary classroom. Then in the 1950's interest was revived in this area and research articles on typing in the elementary grades were given a good share of space in educational journals.

In 1955, Olson and Jaskari (1955) introduced typing to students in grades 1-9. The program emphasized teaching them to type using correct fingering. They observed a noticeable relationship between progress in typewriting and progress in other subjects and they concluded that most pupils achieve success in typing commensurate with that in other subjects. They also observed that some pupils who were handicapped in other subjects because of reading difficulties were able to do well in typing and the authors thus noted that students with a reading handicap may do better work in typing than in other school classes.

Perhaps the most recent and significant studies investigating typing in the elementary program were three separate studies directed by Durrell, Erickson and Moore (Manual Portable Typewriter, 1960) with research grants from a typewriter firm. These investigations were conducted with fourth and fifth grade pupils. Given the proper instruction, pupils were able to learn, in relatively short periods of time, how to operate the typewriter

at speeds two or three times their handwriting speeds. In two of the studies there was a positive correlation between pupil IQ and typewriting ability. However, pupils of different ability found in the typical classroom were all able to learn to type and to benefit from it. In all three studies there was a slight gain in both the speed and quality of handwriting among pupils who learned typewriting. The major purpose of these studies was to investigate the effect of the use of the typewriter on educational achievement. In general, the findings indicated that the process of introduction of the typewriter into the elementary grades did not deter general educational achievement and in some cases it seemed to be a factor in improvement in certain areas of tool subjects. However, although there was a general tendency for the typewriting group to make more gains than the non-typewriting group, not all of the gains were statistically significant and in a few instances the non-typewriting group made the largest gains. There is clearly a need for further research in this area.

These same studies by Durrell, Erickson, and Moore indicated that the use of the typewriter greatly facilitated the learning of correct punctuation and capitalization. Typewriting stimulated creativity in that pupils using typewriters tended to increase their quantity of written work and researchers noted that the quality of the work also showed improvement. However, further research using quantitative measures of improvement in quality and more exacting measures of increases in creativity would seem to be indicated.

Capehart and McNish (1959) made an intensive investigation of research concerned with typing in the elementary grades. They critically reviewed the major research and concluded that in general, studies showed that

through the use of the typewriter: (1) children tend to spell, read and write better; (2) papers are neater: they learn to punctuate, paragraph and proof read; (3) they make more projects and displays; (4) they take pride in their work: they tend to have an improved attitude toward school work; (5) they become more responsible and more independent; (6) they feel successful and more self-confident; (7) creative expression is stimulated; and (8) they are able to acquire typing skills. However, these same authors point out that although the typewriter seems to be valuable as a teaching tool in the elementary grades, there is a great need for more research in this area. The findings of such atudies as those conducted by Durrell, Erickson, and Moore need to be supported by other studies so that educators may have more basis upon which to judge the merits of including typewriting in the elementary program. Studies are needed which offer guidance in the development of effective teaching methods. Many research projects were lacking in scope in that the duration of the studies were too short. Other projects did not include the use of control groups against which results could be compared. Certain other extensive studies such as those of Wood, Haefner and Freeman need to be followed up and expanded under present-day conditions utilizing the more advanced research techniques and evaluative procedures which have been developed in recent years. The research methods of many earlier studies have not been clearly described and many such studies seemed to be based more upon observation rather than the utilization of quantitative measurement of the factors involved. Lack of control of extraneous variables rendered the findings of some studies ambiguous. Capehart and McNish note there has been "virtually no investigation into the role of the portable typewriter as an influence on pupil creativity" (Capehart and McNish, 1959, p. 26). The specific effect of

typewriting on creativity has not been investigated in that creativity itself has not been measured in an objective or quantitative way. Most of what has been said about creativity has resulted from more casual observations of compositions and essays and creativity has not been distinguished from productivity.

Today there is considerable concern for enriching the curriculum for the academically talented pupils. Yet an extensive review of the literature revealed virtually no studies concerned with the use of typewriting with this group of children in the elementary school. Hutchings (1951) cites a study reported by Goddard where typing was introduced to a class of gifted children and found to be a great promoter of correct spelling, capitalization, punctuation and paragraphing. However, reference to the original source of this report (Goddard, 1928) gives little indication of the research methods employed and one is lead to conclude that quantitative measurement was lacking or inadequate. Rowe (1959) reports a study performed with third and fourth grade children with average IQ's ranging from 120-124. However, group tests rather than individual tests were used to determine the IQ's and not all children in the study were academically talented. This study was of short duration, however, since it was conducted during the summer vacation period. It was further complicated by the fact that while the experimental group took typing during the summer, the control group pursued the normal activities of youngsters during the summer vacation period and hence were not subjected to a formal learning experience as was the experimental group.

In summary, then, there is need for more research investigating the effects of typewriting in the elementary curriculum. There is a special need to investigate the typewriter as a tool of enrichment in a program

for academically talented children. Such research should not only measure the effects of typewriting activity on achievement in the basic tool subjects but should also quantitatively measure more subtle types of learning such as advancement in creative thinking and creative writing.

## Chapter III

## THEORETICAL ORIENTATION AND HYPOTHESES

It may be that academically talented pupils view the actual physical operation of writing as laborious and as an obstacle interferring with their thought processes since they have to take the necessary time to manually record their ideas. Using the typewriter may free these pupils to more fully devote their attention to thought content, since it is theorized that typing may require less effort than handwriting. If typing interferes less with thoughts and ideas than does the process of handwriting, then academically talented children may have more time to engage in actual thinking and they may also record more of their ideas. Many investigators (Conrad, 1935; Durrell, Erickson and Moore in the Manual Portable Typewriter, 1960) note that typewriting appears to foster creativity although it appears that creativity was not precisely measured other than observing changes in length and quality of productions. Then too, in evaluating research on the use of the typewriter in the curriculum of elementary school children, investigators (Haefner, 1937; Hutchings, 1951; Durrell, Erickson and Moore in Manual Portable Typewriter, 1960) note that typewriting appears to have favorable effects on achievement in various tool subjects. It seems probable that typewriting aids children through both direct and subtle means to increase their skill in some subjects such as reading, spelling, language and work study skills. The exact role typewriting may play in improving achievement has not been clearly delineated. Typing may help focus the child's attention upon the detailed character and structure of words. Furthermore typing may facilitate achievement through less readily observable means.

Using this theoretical orientation, the following hypotheses are to be tested in this study:

The academically talented pupils who are provided with an enriched program which stresses creative thinking and creative writing through the use of typing to facilitate the development of these abilities will show significantly greater gains in the following areas than the contrast group where creative thinking and creative writing are also stressed but where typing is not used to facilitate the development of these abilities:

A. Reading and spelling as measured by the California Achievement Test

B. Work Study Skills as measured by the Iowa Every Pupil Tests

C. Creative thinking as measured by adaptations of Guilford's Tests, Consequences and Unusual Uses

D. Creative writing - using stimulus pictures with productions rated by judges according to a set of criteria

## Chapter IV

## DESCRIPTION OF STUDY

### Selection of Subjects

Initially the study included 65 academically talented pupils at the intermediate grade level who had individual intelligence quotients of 115 and above as measured by the 1960 Stanford-Binet Intelligence Scale. The study was designed to extend for three years, with the 65 subjects being tested at the beginning of the study when they were beginning fourth grade and re-tested at the end of the study when they were completing sixth grade. Originally the experimental group consisted of 31 children in two different schools grouped together in heterogeneous classes for instructional purposes. The enriched curriculum stressing creative thinking and creative writing included typing as a means for developing these abilities. The initial contrast group was composed of 34 children in two schools, also enrolled in heterogeneous classes. Their instructional program also included an enriched curriculum stressing creative thinking and creative writing but typing was not used to facilitate the development of these abilities.

At the beginning of the second year of the study, both the experimental and contrast groups suffered a loss in subjects since some children moved away from the community or to an area served by another school. Only 23 subjects remained in the experimental group while 30 subjects remained in the contrast group. Because the number of children remaining in the experimental group had dropped considerably and because more losses could be expected the following year, it was decided to add new subjects to both groups since two years still remained in which to implement the methods

of the study. Ten subjects were added to the experimental group, bringing the total number of subjects in this group up to 33. Three new subjects were added to the contrast group, which then had a total of 33 subjects also.

Although losses in subjects occurred again at the beginning of the third year, new subjects were not added to the study because these new subjects would have had only one year of exposure to the teaching methods of the project. At the end of the study, then, the experimental group had 26 subjects while the contrast group included 27 subjects, making a total of 53 children involved in the project.

Characteristics of Subjects and Problems Involved in Implementing the Study

All subjects included in the study were white children. Table 1 presents the mean chronological age, mean mental age and mean IQ of children in the two groups at the beginning of the study. Of the 13 children who were added to the project at the beginning of the second year, 11 still remained at the close of the study. Eight of these children were in the experimental group and three were in the contrast group.

In order to include the mental and chronological ages of the new subjects in the statistics describing the mean mental and chronological ages of the subjects at the beginning of the study, it was necessary to assume that the IQ's of the new subjects had remained constant from the previous year, determine their age at the beginning of the year in which the project was started and from the chronological age and IQ, determine what their mental age would have been at that time. Inspection of Table 1 reveals that experimental and contrast groups were approximately equal

Table 1

Mean Chronological Age, Mental Age and IQ of Subjects At Beginning of Study

| Variable | Experimental Group (N = 26) | Contrast Group (N = 27) | Value of t |
|---|---|---|---|
| Mean Chronological Age | 9.2 years | 9.4 years | -.73 |
| Mean Mental Age | 11.8 years | 11.8 years | -.55 |
| Mean IQ | 124.6 | 123.2 | .70 |

Note: None of the above t - tests reached significance at the 5% level (2 - tailed tests).

A minus (-) t indicates that the obtained mean score of the contrast group was above the obtained mean score of the experimental group on the measured dimension but the difference was not statistically significant.

with respect to mean chronological age, mean mental age and mean IQ. The mean chronological age was 9.2 years for the experimental group and 9.4 years for the contrast group. Both groups had a mean mental age of 11.8 years while the experimental group had a mean IQ of 124.6 with the contrast group having 123.2 as their mean IQ.

Table 2 presents the sex of the subjects. It can be readily seen that there was an approximately equal number of boys and girls in the study as a whole as well as in the experimental and contrast groups considered separately.

During the first year of the study the socio-economic status of the experimental and contrast groups were approximately equal, both groups being drawn from schools serving children from homes of low-average socio-economic status. However, at the beginning of the second year of the study, it was necessary to include as experimental subjects, children from a school drawing from a high-average socio-economic population. Of the twenty-seven experimental subjects, eight were then from a school somewhat higher in socio-economic status than the schools from which the contrast group of children were drawn. Therefore, the socio-economic status of the experimental and contrast groups may be only roughly equal and it is possible that the experimental group contained some children who were from slightly higher socio-economic backgrounds.

Although socio-economic status may have been slightly in favor of the experimental group, a number of other factors arose which seemed to place the experimental group at a disadvantage.

During the first year of the project, some of the children in the experimental group were attending school for only a half-day. This measure was necessary because of crowded school conditions in one area.

Table 2

Sex of Subjects

| Group | Male | Female | Total N |
|---|---|---|---|
| Experimental | 14 | 12 | 26 |
| Contrast | 14 | 13 | 27 |
| Total N | 28 | 25 | 53 |

At the time children were screened for this project, it was not known that it would be necessary to take such a measure. Of the experimental subjects exposed to a year of half-day school sessions, six remained in the project till the completion of the study. The condition of half-day school sessions may have hindered the experimental subjects in achievement gains. Then, too, when these children were on half-day sessions, the teacher found it difficult to work the typing instruction into the curriculum since time was at a premium and it was feared that achievement in the tool subjects might suffer.

Another factor which required additional adjustment on the part of the experimental group was that of changing schools. As previously mentioned, the experimental subjects were drawn from an area where there was a shortage of adequate classroom space. In an attempt to alleviate this, school boundaries were changed during each of the three years of the study. Many children experienced moves to two different schools and some moved to three different schools during the course of the study. Undoubtedly, those children who had to move from school to school were faced with adjustment problems to new school settings and to new peers.

Previous to the actual initiation of the project, meetings were held with the school principals and teachers of the children who were to be included in the study. The subjects were enrolled in heterogeneous classes composed of children with IQ's below 115 who were not serving as subjects for the study. School personnel believed that typing should be taught to all children in the classroom, regardless of whether or not they were subjects for the study. This measure was believed to be desirable so that the other children in the class would not feel left out. In addition, it was anticipated that there might be protests from parents

if some children in the class were not receiving typing. With this arrangement, there was an average of three children per typewriter. In retrospect this plan seemed to have its disadvantages also. Teaching typing to the whole class actually penalized the pupils in the project because when typing was taught to different groups at different times the typewriters were not always free for additional practice or use in subject matter fields.

In their research on the use of the typewriter with fifth grade elementary school pupils, Erickson and Clow (1959) report that the experimental teacher went through an initial period of caution and skepticism but afterwards became enthusiastic about the classroom use of the typewriter. The teacher did express the concern, however, that if typewriters were to be introduced into the elementary school classroom there probably would be a need for skilled typewriting instruction. This same general attitude seemed to prevail among the experimental teachers in this study. In addition, with one exception, the experimental group changed teachers each year and therefore were exposed to initial caution concerning the use of the typewriter each year. Only a small portion of the experimental subjects had the same teacher for two years. Material for teaching typing was provided to the experimental teachers but perhaps an effort should have been made to formalize a pattern of standard teaching techniques to be used by all the experimental teachers.

After the first year of the study, difficulty arose in supervising the work of the experimental teachers. This difficulty arose because the consultant for the gifted had many other duties besides supervising the teachers in this project. Only limited supervision and consultation could be given to the experimental teachers concerning the use of the

typewriters in their class. Thus, teachers may have had difficulty implementing the use of the typewriter and possibly there was considerable variation in the amount of time devoted to using the typewriter as a tool in learning basic subject matter.

There is also a question of how much basic typewriting skill a pupil should have before he tries to apply that skill in his regular written work. Many of the experimental teachers stated that they did not use the typewriters in preparing written assignments as much as they had originally intended because the children were slow typists.

As mentioned previously, the experimental group had another disadvantage when compared with the contrast group since the experimental group contained eight children who were in the study only two years while the contrast group contained only three such subjects.

In retrospect, then, even though the socio-economic factor probably was slightly in favor of the experimental group, there seems to have been many other factors operating during the course of the study which placed the experimental group at a disadvantage.

Method of Gathering Data

In the fall of 1960 when the study was initiated all children in the experimental and contrast group were administered the 1960 Stanford-Binet Individual Intelligence Scale. At this time and again at the completion of the study in the spring of 1963, all subjects in both the experimental and contrast groups were administered the following tests:

1. California Achievement Tests (The reading and spelling sections were administered.)
2. Work-Study Skills Tests of the Iowa Everypupil Tests of Basic Skills

3. Unusual Uses Test and Consequences Test (These two tests were included as measures of creative thinking. They are based on Guilford's (1950) tests and had been previously adapted by Champaign (1961) for use with children.)

4. Creative Writing Test (Subjects were shown four large pictures, one at a time and were given ten minutes in which to write a story for each picture. The children were instructed to write as creatively as they could. This test was designed to measure creative writing abilities. Three judges rated the productions following a set of criteria delineating characteristics of creative writing as reported by the literature in this field. Intercorrelations of the scoring among the three judges ranged from .67 to .86. These are Pearson r correlations. In analyzing the results the scoring of the consultant for the gifted, who served as one of the judges, was used since this person was very familiar with the creative writing of children. It was believed that the ratings of the consultant for the gifted were perhaps more valid because of her experience with children's creative works. See Appendix I for a copy of the rating scale used to judge these stories.)

New subjects who were added to the project at the beginning of the second year were administered all of the above instruments at the time of their entrance into the study and again two years later at the completion of the study.

At the close of the study, a typing test was administered to the experimental subjects. The test consisted of having the children type an unfamiliar story. This test was used to determine the number of words per minute that each child was able to type.

Methods of Implementing Instruction in Creative Thinking and Writing and in Typewriting

Subsequent to the collection of all the initial data, teachers attended a workshop one hour each week for fifteen weeks each year of the study under the leadership of the consultant for the gifted. The workshop was concerned with ways of stimulating creative thinking and creative writing of children in the project. (See Appendix II for outline of content of workshop.) Participants in the workshop analyzed the kinds of thinking children do, distinguishing between creative thinking and other kinds of thinking. They attempted to show how creativity can be trained. Lessons were planned to tap the major intellectual processes as defined by Guilford (1959[a] and 1959[b]) and to try these in classes. Examples of children's responses were then brought to the workshop and analyzed as to the kinds of products and operations children exhibited. Teachers identified the products and operations most useful in training creativity and concentrated on these in their teaching planning and practice.

Typewriters were provided for the experimental group after the collection of the initial data had been completed. At the beginning of each year meetings were held with teachers of children using typewriters to discuss any problems arising in this area. Typing materials suitable for elementary pupils were provided. Teachers of the experimental subjects taught typing three times weekly for periods of twenty minutes. In addition, teachers were encouraged to make the typewriters available for use throughout the day.

Other than conducting creativity workshops with the teachers of both groups and providing typewriters and typing material for the experimental group, no basic changes were made in the curriculum of the subjects.

Teachers of both groups were encouraged to stress creative thinking and creative writing in their classes. The teachers of the experimental subjects were encouraged to stimulate the children to make frequent use of the typewriter in their class work but, as mentioned previously, difficulties arose in implementing this plan.

Method of Analysis of Data

Statistical techniques used in the evaluation of the data were selected after due consideration of the assumptions upon which each is dependent and the extent to which the data satisfied these assumptions. The statistical techniques employed included *t* tests for differences in means and *F* tests for differences in variances if the data indicated a need for such tests. All differences between the experimental and contrast groups on initial measures were analyzed by means of two-tailed *t* tests since the direction of these differences was not predicted. Since it was hypothesized that the experimental group would make greater gains in areas of achievement and creativity, the differences between the two groups in terms of gain scores were analyzed by one-tailed *t* tests. The gain scores were obtained by subtracting the subjects' scores on initial measures from their scores on final measures. Hence, these gain scores provide an index of the subjects' growth in various areas over the duration of the study.

## Chapter V

## RESULTS

Table 3 presents a comparison of the initial mean scores and mean gain scores for the experimental and contrast groups with regard to achievement measures. Inspection of this table reveals that the experimental group did not show significantly greater gains than the contrast group. It is to be noted that in the case of the California Reading Test, initial data are not given and post data scores were analyzed in place of gain scores. This step was followed because at the end of the project when all data were scored and analyzed it was noted that the initial data in the area of reading on the California test represented extremely unreliable scores. The elementary battery (for grades 4, 5, and 6) of the California test was used on initial testing. When these tests were scored and analyzed it was discovered that 17 out of the 26 experiemental subjects and 14 out of the 27 contrast subjects scored in the upper unreliable ranges of the test which are marked by shaded areas on the individual test profiles. Had the tests been scored immediately after they were administered, this difficulty would have been noticed and the junior high level of the test would have been administered. In speaking of this problem in relation to the individual student, the manual for the California test states: "Thus, if the majority of the pupil's scores fall in the shaded area to the right of the profile, retesting with the unior high level of the battery will no doubt yield a more accurate evaluation of his actual achievement" (California Achievement Test, 1957). Thus, with more than half the subjects scoring in the shaded areas of the norms, it was concluded that the initial testing in the area of reading was unreliable. In Table 3, then, the post reading scores are given. Whether one group made more reading gains than the other

Table 3

Comparison of Initial Mean Scores and Mean Gain Scores for Achievement Measures (Data in terms of grade placement and grade-level gains)

| Measure | Initial Data | | | Gain Scores | | |
|---|---|---|---|---|---|---|
| | Mean of Experimental Group (N = 26) | Mean of Contrast Group (N = 27) | t | Mean of Experimental Group (N = 26) | Mean of Contrast Group (N = 27) | t |
| California Total Reading | ——— | ——— | ——— | Post Score of 9.23 | Post Score of 9.56 | -.43 |
| California Spelling | 6.90 | 6.06 | 2.24* | 2.65 | 2.41 | .71 |
| Work Study Skils (Total Score) | 5.86 | 5.59 | .92 | 2.49 | 2.54 | -.16 |

* = t significant at 5% level

** = t significant at 5% level

Note: a. Two-tailed tests used for initial data and post data because direction of difference not predicted

b. One-tailed tests used for gain scores because direction of difference predicted

in terms of reading achievement at the end of the study. Initial and post scores on the California spelling test and the Work Study Skills Test were within reliable ranges of the respective norms for these tests, so initial and gain scores could be analyzed in these areas. The contrasting gains of the two groups did not differ significantly in the area of spelling or work study skills. On initial data, the two groups did not differ in the area of work study skills. The experimental group, however, initially had a significantly higher spelling score and although they made more gains in spelling throughout the course of the study this did not reach statistical significance. It should be noted that in no instance where t reached significance, did the variances for the two groups differ significantly.

A comparison of mean initial creativity scores and mean gain scores in creativity is presented in Table 4. Inspection of this table shows that although the experimental and contrast groups did not initially differ significantly on any of the creativity measures, the experimental group made significantly more gains on all but one creativity measure. The areas in which the experimental group manifested significantly greater gains than the contrast group were: 1) on the obvious score of the Consequences test which measures ideational fluency; 2) on the fluency score of the Unusual Uses test which represents another measure of ideational fluency; 3) on the flexibility score of the Unusual Uses test which measures flexibility in thinking; and 4) on the scores for the stimulus picture stories which measures ability in the area of creative writing. The experimental group also showed a greater gain on the remote score of the Consequences test although this gain was not statistically significant. This remote score is an index of originality.

Table 4

Comparison of Initial Mean Creativity Scores
and Mean Gain Scores in Creativity

| Measure | Initial Data | | | Gain Scores | | |
|---|---|---|---|---|---|---|
| | Mean of Experimental Group (N = 26) | Mean of Contrast Group (N = 27) | t | Mean of Experimental Group (N = 26) | Mean of Contrast Group (N = 26) | t |
| Consequences Obvious Scores | 18.92 | 16.88 | 1.12 | 6.42 | -.70 | 3.82** |
| Consequences Remote Score | 3.00 | 3.37 | -.23 | 2.15 | 1.44 | .90 |
| Unusual Uses Fluency Score | 17.57 | 21.03 | -1.33 | 11.61 | -.63 | 4.26** |
| Unusual Uses Flexibility Score | 12.88 | 14.62 | 1.06 | 7.65 | .59 | 4.03** |
| Score on Stimulus-Picture Stories | 33.42 | 35.21p | -.45 | 3.69 | .30 | 2.66** |

** = t significant at 1% level

Notes: a. Two-tailed tests used for initial data because direction of difference not predicted.

b. One-tailed test used for gain scores because direction of difference predicted.

c. A minus (-) t indicates that the obtained mean score of the contrast group was above the obtained mean score of the experimental group on the measured dimension but the difference was not statistically significant.

The experimental group was administered a five-minute typing test. The typing test consisted of an unfamiliar story. The total number of words divided by 5 rendered the gross number of words per minute for each child. The mean gross words per minute for the group was 17.4 while the median gross words per minute for the group was 18.0. The number of errors was multiplied by five and subtracted from the gross words per minute to give each child's net words per minute. The mean net words per minute for the group was 11.5 and the median net words per minute was 15.0.

In summary, the statistical results did not confirm the hypothesis that the experimental group would make greater gains in spelling than would the contrast group. Gains in reading achievement could not be measured by neither group was superior to the other on post reading scores. The hypothesis that the experimental group would show greater gains in work study skills did not receive confirmation from the data. As was the case with spelling, the experimental group did as well in the area of work study skills as the contrast group but their gain was not significantly greater than that of the contrast group. The hypothesis that the experimental group would make significantly greater gains in creative thinking received strong confirmation from the data. The results also supported the hypothesis that the experimental group would show greater growth in creative writing. In general, then, the data gave support to some of the hypotheses of this study. As delineated in the discussion, however, clear cut interpretation of these findings has been complicated by other variables which arose during the course of the project.

## Chapter VI

## DISCUSSION

The main purpose of this study was to investigate the effects on achievement and growth in creativity of academically talented children when typewriters are used in an enriched curriculum which stresses creative thinking and creative writing. It was believed that using the typewriter may free academically talented pupils to more fully devote their attention to thought content, since typing may require less effort than handwriting. If typing interfers less with thoughts and ideas than does the process of handwriting, then academically talented children may have more time to engage in actual thinking and they may also record more of their ideas. In addition, past research has indicated that typing seems to foster creativity, although creativity was not often measured quantitatively nor has it always been distinguished from productivity. For the purposes of this study, it was hypothesized that academically talented pupils who are provided with an enriched program which stresses creative thinking and creative writing through the use of typing to facilitate the development of these abilities show significantly greater gains in reading, spelling, work study skills, creative thinking and creative writing than do a contrast group where creative thinking and creative writing are also stressed but where typing is not used to facilitate the development of these abilities.

The results strongly confirmed the hypothesis in respect to creative thinking and creative writing where the experimental group made considerably greater gains than did the contrast group. These gains were statistically significant. Data did not confirm the hypothesis in regard to achievement gains in reading, spelling and

work-study skills. The use of the typewriters in the elementary classroom did not seem to be detrimental to scholastic achievement and may have even facilitated certain types of learning processes such as creative thinking and creative writing. Yet, because certain extraneous variables operated during the course of the study, no clear-cut interpretation can be made of the findings. The possible relationship of these extraneous variables to the statistical findings of this study merits discussion.

It was expected that the experimental group who were using the typewriters would make greater gains in reading, spelling, and work-study skills. Results showed that although the experimental group were doing as well as the control group, they were not doing better. Thus, the results of this study show that the use of typing did not deter educational achievement. If it were not for the fact that other extraneous variables were operating in this study, it could be claimed that the use of typing in the elementary curriculum fostered growth in creative thinking and creative writing. While teachers of both the experimental and contrast groups attended the same creativity workshop, the experimental group, who used typewriters, made significantly greater gains in creativity than the contrast group who did not use typewriters in the classroom. However, the experimenters are aware of the fact that these significant gains in creativity may or may not be related to the use of typing in the classroom.

One unexpected finding was the fact that the average number of gross words typed per minute was low, being only 17.4. This does not compare favorably with other studies where the mean rate was 23 to 40 gross words per minute (Erickson and Clow, 1959). This seems to indicate

that the experimental subjects did not receive enough typing practice. Perhaps three twenty-minute periods of typing per week did not provide enough instruction in this area. Teachers reported that the children were slow typists and that they did not encourage the children to type regular class assignments as much as they had originally intended because the typing rates of the children were slower than their handwriting rates. Teachers were reluctant to use typing with regular class work and, in retrospect, it seems that they should have been given more consultative help in doing this.

Then, too, all the children in the class received typing instruction and used the typewriters. Perhaps typing should have been made available only to those academically talented pupils who were subjects of this study. With all the children using the typewriter, there was a ratio of one typewriter to every three children. Since typewriters had to be shared with other children, the subjects of this study were penalized because the typewriters were not always available when they wanted to use them. This certainly could have been a factor which discouraged them from using the typewriter in producing their regular class assignments.

Another factor discouraging the use of the typewriter was the fact that some of the experimental children attended school for only half-day sessions during the first year of the project because of crowded classroom conditions. The teacher of these children was reluctant to use the typewriters as much as she would have liked because her time for covering regular material had already been decreased because of the half-day session.

The consultant for the gifted who conducted the creativity workshops for the teachers of both the experimental and contrast groups noted, in

retrospect, that the teachers of the experimental group seemed to focus more on creativity than on the use of typing. Since the teachers of the contrast group who were not using typing with their classes also attended the same workshop, discussions always centered around developing creativity and the use of the typewriter in facilitating this development was not discussed. Thus, it appears that the teachers of the experimental group somewhat lost focus of this study and concentrated on developing creativity, neglecting to emphasize the use of the typewriter as a tool in developing creative abilities. The teachers of the contrast group, on the other hand, seemed to be concerned that their pupils may not achieve as well as the experimental subjects who had the use of typewriters. These teachers seemed to be concerned about achievement in the tool subjects. If the teachers of the experimental subjects emphasized creativity and divergent thinking they may have de-emphasized the convergent type of thinking usually tapped by achievement tests. In like manner, if the teachers of the contrast group were concerned with achievement in tool subjects, they may have stressed convergent thinking (such as tapped by ordinary achievement tests) and de-emphasized divergent thinking processes involved in creativity. If this approach were followed by the two sets of teachers, it would be easy to see why the experimental group may not exceed the contrast group on achievement tests in tool subjects (convergent thinking) but would be superior to them on creativity tests which tap divergent thinking.

This research shows that creative thinking and writing apparently can be fostered. Observations of the teachers in the project suggest that teachers need help in realizing that both divergent and convergent

thinking are important. In particular, teachers seem to need help in learning how to apply creative thinking processes in teaching content material and to see the role of both divergent and convergent thinking in learning situations. They seem to need help in realizing that although a student should be encouraged to explore many alternatives in solving a problem (divergent thinking), he may eventually have to decide upon the one solution which seems to be best suited to the problem (convergent thinking).

In reality it seems surprising that the experimental subjects were able to do as well as the contrast subjects on achievement measures. In view of the fact that some of the experimental subjects changed schools two and three times during the study, attended school for only half-day sessions and had a greater proportion of subjects who were only in the project two years, their achievement seems remarkably good. Besides maintaining good achievement in reading, spelling and work-study skills these children learned how to type. Granted their rate of typing was slow but the differences between their gross (Md = 18.0) and net (Md = 15.0) scores indicate that they tended to be accurate typists, making a minimum number of errors. It should be noted that many other studies on the use of typewriting in the elementary curriculum only report gross words per minute and do not subtract words for errors to give a net words per minute score. Perhaps teachers of pupils in other studies stressed speed whereas the teachers of the subjects in this research stressed accuracy. Possibly pupils should be allowed to become more proficient typists before typing is greatly used in performing regular class assignments. If the students are not proficient in typing then both they and their teachers may become discouraged when typing is used to perform regular class assignments.

In conclusion, then, the results of this study show that the use of typing in the curriculum of academically talented elementary school children is not detrimental to achievement in areas such as reading, spelling and work-study skills. Academically talented children using the typewriter showed significantly greater gains in creative thinking and creative writing than academically talented children who did not use the typewriter. However, the greater gains made by the experimental group of children may be due to factors other than or in addition to that of using typing as a tool to facilitate the development of these abilities. Results also showed that academically talented children can learn to use the typewriter with skill. Children not only learned how to type but also kept their achievement at a high level and evidenced considerable growth in creative thinking and creative writing abilities.

## Chapter VII

## SUMMARY AND IMPLICATIONS FOR FURTHER RESEARCH

### Summary

#### Problem and Hypotheses

There is considerable discussion in the literature as to the need for enriching the curriculum for the more able or the academically talented pupils. Just how this enrichment is brought about is not so clear. There is also concern among some that if more is added to the conventional curriculum, achievement in the tool subjects will suffer. Research needs to be conducted to determine the worth of specific enrichment activities and to measure the effects of such activities on achievement in the tool subjects. Learnings which existing standardized achievement tests fail to tap such as growth in creative thinking and creatave writing should also be measured.

The purpose of this research was to investigate the use of typewriting in an enriched curriculum which stresses creative thinking and creative writing. It was hypothesized that academically talented, elementary age pupils who are provided with an enriched curriculum which stresses creative thinking and creative writing make significantly greater gains in reading, spelling and work-study skills and show greater growth in creative thinking and creative writing abilities than do a contrast group who are also provided with an enriched curriculum stressing creative thinking and creative writing but where typing is not used to facilitate the development of these abilities.

#### Description of the Study

The subjects for the study were intermediate grade children with IQs of 115 or above. Twenty-six children comprised the experimental

group while the contrast group consisted of twenty-seven children. The children were from approximately equal socio-economic backgrounds. The experimental group had a mean IQ of 124.6 while the contrast group had a mean IQ of 123.2. There was no significant differences in the mean mental or chronological ages of the two groups. The number of boys and girls was approximately equal in the study as a whole as well as in the experimental and contrast groups considered separately. The project continued for three years until the subjects completed the sixth grade. Children in both the experimental and contrast groups were enrolled in heterogeneous classes made up of children whose intelligence ranged from dull-normal to gifted.

Before being included in the project all children were administered the 1960 Stanford-Binet Individual Intelligence Scale. At the beginning and again at the end of the study all subjects were administered: 1) the reading and spelling sections of the California Achievement Tests; 2) the Work-Study Skills Test of the Iowa Every Pupil Test of Basic Skills; 3) the Unusual Uses and Consequences creativity tests; and 4) a stimulus-picture creative writing test. At the completion of the study, teachers administered a typing test to the experimental group.

Subsequent to the collection of all the initial data, teachers attended a workshop one hour each week for fifteen weeks each year of the study. This workshop was under the leadership of the consultant for the gifted and was designed to aid teachers in developing the creative thinking and creative writing skills of their pupils.

Typewriters were provided for the experimental group after the initial data had been collected. At the beginning of each year meetings were held with teachers of children using typewriters to discuss any

problems arising in this area. Typing materials suitable for elementary age pupils were provided. Teachers of the experimental subjects taught typing three times weekly for periods of twenty minutes and were encouraged to make the typewriters available for use throughout the day.

Results and Conclusions

The experimental group did not exceed the contrast group in achievement in reading, although they did as well as the contrast group. Both groups were achieving at their expectancy levels in reading at the completion of the study. The contrasting gains of the two groups did not differ significantly in the area of spelling or work-study skills. The experimental group manifested significantly greater gains on the creative thinking measures and also on the measure tapping creative writing skills. However, because extraneous variables were operating during the course of the study it is not known whether the greater gains of the experimental group in the area of creativity can be attributed to the use of the typewriter.

The following conclusions seem to follow from this research:
1) Using typewriting in the elementary school curriculum does not appear to be detrimental to achievement in basic tool subjects. In this study, the use of typing was not detrimental to the achievement of academically talented subjects in the areas of reading, spelling and work-study skills.
2) Growth in creativity can apparently be fostered among academically talented children in the elementary grades. The exact role typing played in fostering creative abilities received no clear cut answer in this research. Yet children using the typewriter showed greater gains in creativity than did the children who did not use the typewriter.

However, factors other than the use of the typewriter may have been related to this growth in creative thinking and creative writing.

3) Academically talented elementary age children can learn to use the typewriter effectively.

## Implications for Further Research

As a result of this study, a number of factors have made themselves evident as being significant for consideration in further research which investigates the use of the typewriter in the elementary curriculum. It seems important that in future research, a specific person should be designated and given sufficient time to aid the teachers throughout the whole duration of the study in implementing the use of the typewriter with regular class work. Perhaps the children should first be allowed time to become proficient typists before attempts are made to encourage them to type regular class assignments. Thus, in the initial phase of the project, perhaps longer and more frequent periods of time should be devoted to teaching the skills of typing. Once the children can accurately type at rates faster than their handwriting rates, both they and their teachers will presumably be more enthusiastic about typing regular class work.

More research is needed to clearly delineate the possible role typing plays in helping to foster creative talent. A valuable experimental design would be one which would compare the relative effects of typing on creativity within a curriculum which stresses creative thinking and creative writing as opposed to the effects of typing on creativity within a traditional school curriculum where no emphasis out of the ordinary is placed on creative thinking and creative writing. Such a design would more clearly pinpoint the relative effects

of typing and a creativity-focused curriculum in their overall effect on growth in creative thinking and creative writing. Both experimental groups (those using typing in a regular curriculum and those using typing in a creativity-focused curriculum) should also be compared with two equivalent contrast groups who are not using typing. One contrast group would have the regular curriculum and the other contrast group would be exposed to the creativity-focused curriculum. A research project with this experimental design would render valuable information on the effects of typing on achievement and creativity in different curricula and still compare these effects with achievement and creativity gains that occur when typing is not used as part of these curricula.

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# APPENDIX

Appendix I

TENTATIVE RATING SCALE FOR STIMULUS PICTURE STORIES

A. General Originality or Uniqueness of Plot (Reality relevance plausibility, feasibility not considered)

| 1 | 2 | 3 |
|---|---|---|
| staid, matter of fact, repetitious presentation of common theme or expected | has one idea, twist or theme which is not ordinarily encountered even if one element only is different | represents an imaginative and ingenious treatment of plot, or characters, or situations in a manner not expected and with treatment consistently carried through story |

B. Stimulus Free vs Stimulus Bound (Reference to picture presented)

| 1 | 2 | 3 |
|---|---|---|
| primarily descriptive--does not depart from situation depicted | elaboration and extension of the picture--departing somewhat | where an idea or plot is only indirectly or remotely suggested by aspects of the picture - using the picture as a springboard for subsequent elaboration |

C. Sense of Humor

| 1 | 2 | 3 |
|---|---|---|
| flat, devoid of humor, colorless and sober | reliance upon physical features or aspects to present a kind of slapstick situation or a single example of subtelty | a consistent sequence of events or situations, emphasis is upon subtlety of contrivance, finesse |

D. Unusualness of Ending (Humorousness not considered)

| 1 | 2 | 3 |
|---|---|---|
| ending follows a routine, stock, or to be expected pattern (lives happy ever after) | use of deception, a knack or ruse to create an artifice which has some element of surprise | clever, cunning, ingenious, and adroit interplay of events to present a suspenseful or unexpected turn (complete surprise) |

E. Coherence and Organization (Also considers fluency, reality, plausibility)

| 1 | 2 | 3 |
|---|---|---|
| disorganized, rambling, presents only glimmers of continuity and interrelatedness | either characters or plot consistently connected by same common relationship or principle | presentation reflects a delicate skill and artistic refinement in a plausible sequence - apt in using picturesque unusual and refined expression |

Appendix II

OUTLINE OF CREATIVITY WORKSHOP

Session 1: Causes for Concern

a. Mental health
b. Achievement in school
c. Occupational success
d. Contribution to society

Session 2: Report on Research

Session 3: The Creative Process

Session 4: Identifying the Creative Personality

Session 5: Kinds of Thinking Children Do

Session 6: The Role of the Teacher in Developing Creative Thinking

a. How can creativity be developed?
b. How can creativity be stifled?

Session 7: Discussion of Tests of Creativity

Session 8 and 9: Discussion of Guilford's Intellectual Operations

a. Cognitive memory
b. Convergent thinking
c. Divergent thinking
d. Evaluation

Session 10: Children's Work

a. Teachers share examples of children's work brought from their classes
b. Analyze examples as to the kinds of thinking involved

Session 11: Discussions of Ways to Improve Techniques of Teaching Children to be Creative

Session 12: Plan Lessons to Tap Productive Thinking

Session 13: Children's Work

a. Analyze examples of children's work as to kinds of thinking involved
b. Discuss ways to improve lesson plans

*Session 14: Develop a Unit Using Productive Thinking

*Session 15: Evaluation

* Developing the unit can be in progress before this session and concentrated work done at this time.